

What Is Claimed Is:

1 1. A data recovery circuit for recovering an m-bit data
2 stream from an n-bit data stream, said data recovery circuit,
3 comprising:
4 an n-bit data reconstruction circuit receiving said
5 n-bit data stream, said n-bit data reconstruction
6 circuit selecting a data boundary from a plurality
7 of boundary selection candidates in response to a
8 boundary selection signal and producing a
9 reconstructed n-bit data stream based on said data
10 boundary;
11 a first-in first-out (FIFO) buffer circuit coupled to
12 an output of said n-bit data reconstruction circuit,
13 said first-in first-out buffer circuit including a
14 register and a write and read control circuit for
15 controlling an n-bit write operation and an m-bit
16 read operation of said register to receiving said
17 reconstructed n-bit data stream and producing said
18 m-bit data stream; and
19 a detection circuit coupled to an output of said FIFO
20 buffer circuit, said detection circuit detecting said m-bit
21 data stream and accordingly producing said boundary
22 selection signal.

1 2. The data recovery circuit of claim 1, wherein n is
2 a positive integer power of 2.

1 3. The data recovery circuit of claim 1, wherein n is
2 smaller than m.

1 4. The data recovery circuit of claim 1, wherein m is
2 not a multiple of n.

1 5. The data recovery circuit of claim 1, wherein said
2 register having a number of bits equal to the least common
3 multiple of n and m.

1 6. The data recovery circuit of claim 1, wherein a ratio
2 of a transmission rate of said m-bit data stream to that
3 of said n-bit data stream is n : m.

1 7. The data recovery circuit of claim 1, wherein said
2 n-bit data reconstruction circuit comprises:
3 an input register for temporarily storing data from said
4 n-bit data stream;
5 a data reconstruction multiplexer coupled to said input
6 register, said data reconstruction multiplexer
7 selecting said data boundary from said plurality of
8 boundary selection candidates in response to said
9 boundary selection signal and selecting
10 reconstructed data from the data stored in said input
11 register based on said data boundary; and
12 an output register coupled to said data reconstruction
13 multiplexer, said output register temporarily
14 storing the reconstructed data selected by said data
15 reconstruction multiplexer and producing said
16 reconstructed n-bit data stream.

1 8. The data recovery circuit of claim 1, wherein said
2 detection circuit is incorporated in a decoder, which is
3 operable to decode said m-bit data stream for output.

1 9. The data recovery circuit of claim 1, wherein said
2 write and read control circuit comprises:
3 a write controller for controlling the n-bit write
4 operation of said register and producing a write

5 pointer indicator signal; and
6 a read controller for controlling the m-bit read
7 operation of said register based on said write
8 pointer indicator signal.

1 10. A data receiving system, comprising:
2 a plurality of data recovery circuits, each for
3 recovering one of a plurality of m-bit data streams
4 from one of a plurality of n-bit data streams and
5 decoding said one of a plurality of m-bit data streams
6 into one of a plurality of decoded data streams, each
7 of said data recovery circuit comprising:
8 an n-bit data reconstruction circuit receiving said
9 n-bit data stream, said n-bit data
10 reconstruction circuit selecting a data boundary
11 from a plurality of boundary selection
12 candidates in response to a boundary selection
13 signal and producing a reconstructed n-bit data
14 stream based on said data boundary;
15 a first-in first-out (FIFO) buffer circuit coupled
16 to an output of said n-bit data reconstruction
17 circuit, said first-in first-out buffer circuit
18 including a register and a write and read control
19 circuit for controlling an n-bit write operation
20 and an m-bit read operation of said register to
21 receiving said reconstructed n-bit data stream
22 and producing said m-bit data stream; and
23 a decoder coupled to an output of said FIFO buffer
24 circuit, said decoder including a detection
25 circuit for detecting said m-bit data stream and
26 accordingly producing said boundary selection
27 signal, said decoder decoding said m-bit data

28 stream into said decoded data stream upon said
29 detection circuit detects a correct condition of
30 said m-bit data stream; and
31 a cycle alignment circuit receiving said plurality of
32 decoded data streams from said plurality of data recovery
33 circuits, said cycle alignment circuit aligning phases of
34 said plurality of decoded data streams to synchronize said
35 plurality of decoded data streams.

1 11. The data receiving system of claim 10, wherein said
2, cycle alignment circuit comprises a plurality of delay
3 lines, each for receiving one of said plurality of decoded
4 data streams, each of said plurality of delay lines
5 including a plurality of delay elements and a selector
6 coupled to outputs of said plurality of delay elements to
7 select one of said outputs of said plurality of delay
8 elements as an aligned output.

1 12. A data recovery method for recovering an m-bit data
2 stream from an n-bit data stream, said data recovery method
3 comprising the steps of:
4 receiving said n-bit data stream;
5 selecting a data boundary from a plurality of boundary
6 selection candidates in response to a boundary
7 selection signal and producing a reconstructed n-bit
8 data stream based on said data boundary;
9 performing an n-bit write operation to store said
10 reconstructed n-bit data stream into a register and
11 performing an m-bit read operation to retrieve said
12 m-bit data stream from said register, a ratio of a
13 rate of said write operation to that of said read
14 operation being $m : n$; and
15 detecting whether or not said m-bit data stream conforms

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to a predetermined format and accordingly producing

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said boundary selection signal.